BARTON M. CLARK

Director of Departmental
Library Services Library
University of Illinois at Urbana-Champaign

KAREN HAVILL BINGHAM

Assistant to the Director
University Libraries
Case Western Reserve University

The New CD-ROM Technology: Shaping the Future of Reference and Information Research

It has been said more than once that students will do online searching as long as it does not cost more than a pizza. That premise is probably true. Several years ago when the University of Illinois at Urbana-Champaign (UIUC) had to almost double the cost of ERIC searches, the number of student searches dropped dramatically. These increased costs and the introduction of laser technology were major factors in the university library's examination of electronic reference tools which could be run by in-house microcomputers rather than vendor-operated mainframes. UIUC, like many other libraries, entered this new world of technology through Information Access Company's InfoTrac. This article describes UIUC's experiences with InfoTrac and the manner in which those experiences contributed to the library's analysis of in-house microcomputer-based electronic reference tools.

InfoTrac indexes approximately 900 journals from *Magazine Index* and *Business Index,* plus the last sixty days of the *New York Times* and the current year of the *Wall Street Journal.* Full citations are given for all entries. The alphabetic index includes subject headings, personal and corporate name headings, authors, and titles. The subject index uses Library of Congress subject headings which have been enhanced by Information Access Company (IAC). Searching is done on single entries with no capabilities to perform Boolean searching.

InfoTrac is marketed as a 12-inch laser disc containing four years of data. The disc is updated and cumulated monthly. Also available is an InfoTrac backfile database containing four years of retrospective data. Title coverage in the retrospective file is the same as in the current database, except that the *New York Times* and *Wall Street Journal* are not indexed. The backfile is updated and cumulated annually. The InfoTrac system hardware allows four microcomputer workstations to be used with a single disc player. Several hardware configurations, software packages, and databases are available from Information Access Company. An annual subscription to the InfoTrac database is $4,500 plus $8,500 for a subscription plan which includes the annual license fee, software package, control unit, all hardware, and hardware maintenance for one access station. The price increases $1,000 with each additional access station up to a maximum of four. After five years on this purchase plan, the hardware becomes the property of the subscriber. Alternative plans allowing subscribers to purchase their own hardware and/or control unit are available. Discounts are available for multiple system and database subscriptions.

UIUC's experiences with InfoTrac began in mid-1985 through a generous grant from the Illinois State Library which allowed for the acquisition of three one-year InfoTrac subscriptions and the attendant hardware. The goal of the project was to demonstrate the value of optical disc databases for storage and retrieval of bibliographic citations to journal articles. The intent was to determine the usefulness and user acceptance of such a system within divergent environments. Three different sites were selected for the project: the University of Illinois Undergraduate library, the Champaign Public Library and Information Center, and the Lincoln Trail Libraries System headquarters. Because of the immense popularity of the system in the UIUC Undergraduate Library, the UIUC Library later acquired an additional subscription for a fourth site in the UIUC Commerce Library.

AVAILABILITY

InfoTrac was available to users in each library during all open hours. Champaign Public Library is open 73 hours per week, Lincoln Trail Libraries System 70, the Undergraduate Library 112, and the Commerce Library 102.

In each setting, with the exception of Lincoln Trail, InfoTrac was located in a highly visible area near the library's reference desk where it was easily accessible to both patrons and staff. At the Lincoln Trail Libraries System headquarters, access was limited to professional and paraprofessional library staff who provide support services to Lincoln Trail's member libraries.

TYPES OF USERS

Champaign Public reported that InfoTrac was used predominantly by high school and college students. Adults from the community also used it, but in most cases they had to be directed to the resource and encouraged to use it. Use by young adults was much more frequent than by older adults. Reference librarians as well as librarians from other departments within the library used InfoTrac heavily.

In the UIUC Undergraduate Library, InfoTrac is used almost exclusively by undergraduate students, although a few graduate students also use it. Use of the system by faculty is rare. Undergraduate librarians use InfoTrac when assisting patrons with difficult information searches and for demonstration purposes. User surveys at Colorado State University (Ernest & Monath, 1986) and Indiana University (Beltran, 1987) corroborate that undergraduate students are the heaviest users of InfoTrac.

The number of graduate students using InfoTrac appears to be relatively small and is confined primarily to the UIUC Commerce Library. Use of InfoTrac by upperclassmen, particularly by students searching for corporate information to prepare for job interviews, is higher, as might be expected, in the Commerce Library than in the Undergraduate Library.

Use of InfoTrac at Lincoln Trail was confined primarily to the system reference librarian who was responsible for answering queries from member libraries. While other Lincoln Trail professionals and paraprofessional reference support staff used it occasionally, they usually referred questions to the reference librarian.

USER RESPONSE

Champaign Public Library and UIUC reported frequent, heavy use of InfoTrac by patrons and library staff. During the school year, queuing of students at the InfoTrac station was constant at UIUC and frequent at Champaign Public Library and Information Center. Librarians at Champaign Public used InfoTrac at least once during every two hour shift. Lincoln Trail's library staff used the system about once a day or once every other day.

According to library staff in the UIUC undergraduate and commerce libraries, each with two InfoTrac workstations, user response to InfoTrac is uniformly and enthusiastically favorable. Both staff and patrons use superlatives when describing their experience with the database. This is especially true in the case of undergraduate students who are described as being "wild" about InfoTrac. Undergraduate students stand in queues at InfoTrac stations rather than use an available paper index located ten

yards away. Students prefer using the laser disc product to all other available indexes such as the *Readers' Guide* or the *Business Periodicals Index*.

After a year, the Undergraduate Library still has long lines at its InfoTrac terminals during peak periods of the semester. Regardless of the time during the semester, at least two or three people can be found waiting at one of the Undergraduate Library's two workstations. Staff maintain that the library could keep an additional two stations busy throughout the semester. The two workstations in the Commerce Library are also in constant use, although that library does not experience the long lines that are typical in the Undergraduate Library. The enthusiastic response by students has been echoed in reports from California State University (Stephens, 1986), Colorado State University (Ernest & Monath, 1986), Indiana University (Beltran, 1986), the University of Colorado (Krismann, 1986), the University of Dayton (Walker & Westneat, 1985), and many other institutions (Tenopir, 1986).

UIUC undergraduate users are enthusiastic about InfoTrac because: (1) it is easy to use, (2) it provides up-to-date information on current topics, (3) it produces instant results, and (4) it eliminates writing down citations. It is the tool preferred by undergraduates for finding the five to ten citations they often need for term papers or speeches. In the UIUC Undergraduate Library, InfoTrac is used primarily for these purposes. In the Commerce Library its main use is in securing information about companies, particularly for job interviews, although it is used often for undergraduate papers.

The ease of use factor is important for users and library staff. The database is publicized as requiring no special training. It is, in fact, largely self-explanatory. UIUC librarians have found it unnecessary to prepare special instructions for using InfoTrac. The instructional card which accompanies the system, the function buttons on the keyboard, and the help screens provide adequate instruction for most patrons to easily access the system.

InfoTrac creates few, if any, demands for additional library staff time to instruct and interpret the system for users. UIUC librarians report that InfoTrac makes life at the reference desk easier because the database and search techniques are so user friendly. Only on rare occasions do staff need to assist users. The experience of UIUC librarians with user education demands is confirmed by other use studies reported in the literature (Tenopir, 1986, p. 19). Beltran (1986) suggests that students require less assistance with InfoTrac than with print indexes covering the popular literature (p. 64).

At Champaign Public Library and Information Center, students doing research papers and adult patrons appreciated the speed of searching and printing, the presence of multiyear references, and the clarity and ease of manipulation among subject headings. Orientation to the computer

and InfoTrac was accomplished easily even by those who had no prior experience with computers. Champaign Public Library and Information Center reference librarians frequently used InfoTrac during information searches. Response speed, ease of searching various subject headings, cross-references, and the print feature made it an especially useful and labor-saving reference source. InfoTrac became a first-used source in the public library.

STRENGTHS

Librarians and users agree that InfoTrac's major strengths are that it is current, fast to use, and very user friendly. Indexing terms relate to the Library of Congress subject headings used in *Magazine Index*. Adequate cross references are used. Other features appreciated by patrons and librarians are availability of printed copy and no telecommunication costs.

In the public library setting, InfoTrac was most helpful and was used most frequently to find information on current topics such as AIDS, child abuse, Alzheimer's disease, drugs, urban gangs, etc. It was heavily used by students as a quick source of reference for reports and research papers. Champaign Public Library and Information Center and Lincoln Trail librarians said that InfoTrac also was used regularly to locate information on corporations and companies, computers and software, consumer product evaluations, and book and movie reviews. Lincoln Trail used it as a supplement to other tools, while the other two libraries' patrons used it as an independent source of information.

WEAKNESSES

The only complaints registered by library patrons are that the database only goes back to 1982 and that just two newspapers are included. Librarians complain that the cooling fan of the microcomputer is too noisy and that abstracts are not available.

Champaign Public librarians noted that an additional source of frustration is that InfoTrac gives incomplete access to the magazine collection film cassettes. Only part of the *Magazine Index* citations are on InfoTrac. Some citations on InfoTrac have no code letters leading to an article which is indeed present in the magazine collection. Other InfoTrac citations give only business collection code letters when the article can also be found in the magazine collection. In addition, codes are sometimes incorrect.

The most serious problem, however, is database errors. Librarians are critical of errors and searching problems in the database. Unfortunately,

spelling errors are common. The precision of subheadings needs to be improved. For example, an article may be indexed under "United States—Economic Policy—Soviet Union" but not under the reverse heading "Soviet Union—Economic Policy—United States."

Another serious complaint is that users cannot enter the database at a subheading under a broad subject heading such as "Agriculture—United States." Rather, users must start with "Agriculture" and page through to "Agriculture—United States." Hall, Talan, and Pease (1987) document similar problems with the use of InfoTrac at California State University and discuss their reservations about the use of InfoTrac as a research tool in academic libraries. Other institutions such as the University of Wyoming have chosen to forego purchase of InfoTrac due to limitations such as these and the lack of software and hardware standardization among vendors (Van Arsdale & Ostrye, 1986).

Despite such criticisms of the database, many librarians believe that adding complex search features to InfoTrac might deter students who now require little help in using the system. It is interesting to note that users do not complain about the errors and indexing problems reported by most librarians who use the database. One can only surmise that despite these limitations InfoTrac adequately meets the needs of most high school and undergraduate students who are using it to find a limited number of citations on a current or popular topic or to obtain company research information.

IMPACT ON THE LIBRARY

The availability of InfoTrac has led to three indirect demands on the UIUC Library system: (1) a demand for more InfoTrac workstations to meet user needs, (2) a demand for more convenient access to journals indexed by InfoTrac, and (3) the desire to link InfoTrac to the UIUC Library's online catalog.

Providing InfoTrac in one departmental library, the Undergraduate Library, created a demand for it in another location on campus, the Commerce Library. As was mentioned earlier, both libraries indicate that their clientele would utilize additional workstations if available. There is no doubt that other departmental units in the UIUC library system would benefit from having InfoTrac stations as well. In addition, if sufficient InfoTrac workstations were available to meet user demands, it is possible that subscriptions to selected print indexes might be cancelled by the library.

Central Reference Services in the UIUC Library has responded with an InfoTrac II test site in the Reference Library of the main library

building. The InfoTrac II database includes those titles in *Magazine Index* plus two months of the *New York Times.* It indexes fewer titles and more popular magazines than InfoTrac.

User response to InfoTrac II and preliminary observations of staff are similar to the reaction toward its predecessor. Patrons are enthusiastic, if indiscriminate, in their praise of the resource. Librarians routinely utilize InfoTrac II in answering reference queries. As with InfoTrac, lack of quality control in the database subject headings and errors in citations are reported. Staff note that the database is almost too easy to use and that patrons overlook nuances in searching that might uncover additional citations. The results of a recent user survey conducted by staff of the Reference Library promise to yield further analysis of InfoTrac II.

It is difficult to gauge whether use of journals indexed by InfoTrac has increased. While UIUC has not conducted a formal, full-scale study to analyze journal usage since the advent of InfoTrac, it generally is believed that use of titles covered by InfoTrac has increased. UIUC library staff are aware of the appearance of more and more students with InfoTrac printouts and are questioned often about the library's holdings of these titles.

Librarians in the Undergraduate Library, and especially in the Commerce Library, find that students are most frustrated because the two libraries do not have all the journals indexed in InfoTrac. (Commerce owns 100 of the 900 journal titles covered by InfoTrac.) Although approximately 85 percent of the journals indexed in InfoTrac are available on the UIUC campus, undergraduate students prefer to consult journals available in the departmental library they are using rather than go to another location to get cited materials.

A recent informal study to evaluate the quality of service to undergraduate students in the Central Bookstacks, which houses over 4 million volumes, confirms this. Users were asked whether they identified needed stacks material through InfoTrac, the library computer system (LCS), a librarian's assistance, or all three. Of 225 responses to the question, only fifteen students said they identified material via InfoTrac, while another sixteen said they used all three sources mentioned. Library staff are convinced that users restrict journal usage to those titles owned by the libraries in which InfoTrac is located.

The Undergraduate Library has generated a UIUC holdings list of all journal titles indexed by InfoTrac to encourage users to pursue available copies elsewhere on campus. The holdings list is posted near each InfoTrac terminal. Despite its availability, there is a definite demand for a computerized link between InfoTrac and the library's online catalog. Students expect to be able to shift from one database to the other at the same terminal and are disappointed that such a feature is unavailable.

USER EDUCATION

As was stated earlier, students find that InfoTrac is extremely easy to use. Consequently, library staff have found that relatively little time is

required in instructing patrons about how to use the database or search techniques. Librarians find that InfoTrac is self-explanatory and requires very little interpretation to users. In all three libraries user education is user-initiated; that is, library staff answer questions and provide assistance to patrons when asked. None of the libraries developed literature describing how to use the system, but all posted the "How to Use InfoTrac" card supplied with the system.

Some disagreement exists between those librarians who think that undergraduate students are well-served and satisfied with the InfoTrac search result and those who believe that unsophisticated users are unaware of the faults of the database and therefore are not locating all available information in searching the database. Tenopir (1986) reports that most librarians agree that InfoTrac should be used as a supplemental tool rather than as a primary research tool. Apparently staff in some libraries, such as the University of Hawaii's, have posted signs warning patrons that InfoTrac does not provide a comprehensive subject search (p. 168).

There is general consensus among librarians that subject headings in the database need improvement and that instruction to users in how to select the appropriate subject heading is desirable although not always possible. When using a system that is otherwise user friendly, students expect to find natural language headings. Since InfoTrac now uses LC subject headings exclusively, the student may fail to discover the relevant subject heading(s) when searching the database.

PROMOTIONAL EFFORTS

Promotional efforts in the UIUC Undergraduate Library include development of a short brochure to announce the availability of InfoTrac and describe its capabilities. The brochure was distributed to all classes in the Undergraduate Library's bibliographic instruction program and made available at all InfoTrac workstations. Undergraduate librarians also mention InfoTrac as a major reference tool in all bibliographic instruction classes. In the Commerce Library, librarians publicize InfoTrac during class presentations and provide demonstrations to interested faculty in the library.

Use of InfoTrac has spread largely by word of mouth among students. Major promotional efforts by the UIUC Library have been unnecessary. Additional publicity would create an overload on the workstations currently available.

OUTCOMES

Despite the success of InfoTrac, both Lincoln Trail Libraries System and Champaign Public Library and Information Center chose not to

renew their subscriptions to the service. Because only librarians were able to access InfoTrac in the Lincoln Trail headquarters setting, the unique advantages which InfoTrac offers to patrons in public settings were reduced significantly in an environment restricted to librarians. Champaign Public Library's decision to cancel InfoTrac was tied directly to cost. While popular with users, it was felt that the $8,000 price tag for InfoTrac did not warrant the cancellation of other resources to continue it. However, the Champaign Public Library subsequently subscribed to InfoTrac II.

At the University of Illinois at Urbana-Champaign the experience with InfoTrac has resulted in an examination of the potential of electronic information systems in general and, in particular, those systems that can be run from a microcomputer. SilverPlatter's ERIC, AGRICOLA, and PsycLIT databases recently have been added to two departmental libraries, and WilsonDisc databases are now available in the Undergraduate and Library Science libraries.

SilverPlatter markets a range of CD-ROM information products whose retrieval software enables users to perform search functions equivalent to those now available from online systems. Key features include Boolean searching, right-hand truncation, searches in specific fields of a record, proximity searching, numeric range and limit searching, help screens, and display and print capabilities. The search techniques and strategies employed are inherently more sophisticated than in InfoTrac and therefore require more elaborate user instruction. Allen (1985) provides a useful system overview and search features of SilverPlatter's CD-ROM products.

While SilverPlatter's products do not compete with InfoTrac, the Wilson products do. The UIUC's first test of Wilson's CD-ROM product was in the Undergraduate Library where it is in direct competition with InfoTrac. Whereas in the last year undergraduate students often have ignored the paper versions of *Readers' Guide* and *Business Periodicals Index* in favor of InfoTrac, it is quite possible that this will not be the case with the new CD-ROM versions of these indexes. Since it will be possible to acquire *Biography Index, Business Periodicals Index, General Science Index, Humanities Index, Readers' Guide to Periodical Literature,* and *Social Science Index* for less than a single subscription to InfoTrac; it is possible that the UIUC Undergraduate Library may cancel its subscription to InfoTrac should a thorough review of the Wilson products indicate that they are as popular as InfoTrac. The UIUC Commerce Library will continue its InfoTrac subscription with additional workstations if queuing becomes a problem.

COSTS

It is important to note the inflated prices of optical disc products. One example is the pricing of SilverPlatter's ERIC database. The annual subscription to the current database with quarterly updates initially was

$1,750; the annual update was $950; and the archival discs were $2,000. When OCLC entered the market with a CD-ROM ERIC database at $600 for OCLC members and $675 for nonmembers, SilverPlatter's price immediately dropped to $650 for the current disc with quarterly updates, $390 for the annually updated current disc, and $900 for the archival discs. Similarly, the price of SilverPlatter's PsycLIT database has dropped recently from $4,995 to $3,995.

In addition, it must be realized that the cost of running the new optical disc products is far greater than the advertized annual subscription price. As Alberico (1987) points out, many hidden costs accompany the use of CD-ROMs. Equipping a single workstation with the necessary hardware—including a PC, printer, and CD-ROM disc drive—requires an initial outlay of between $2,000 and $3,000. Thereafter, equipment will incur maintenance costs.

Printing costs can be significant also, especially to operate quiet printers such as the Hewlett-Packard Thinkjet which are essential for use in public areas. Information Access Company estimated that supplies for one workstation cost from $500 to $750 a year (Pease & Post, 1985). Experience at the University of Illinois indicates that paper, ink, and/or cartridge costs can range much higher per year, from $1,000 to $1,500 per station when heavily used.

Based on usage during the first semester (Fall 1986) of operation in UIUC's Undergraduate Library, printing costs for two InfoTrac workstations with a Thinkjet and an Epson printer were estimated at $2,500 per year. During the next semester (Spring 1987) this amount decreased significantly to approximately $600 per year. These costs include paper as well as cartridges or ribbon cassettes for the printers. Library staff credit the precipitous decline in amount of printing not to a decrease in the use of InfoTrac but to the fact that students with more searching experience are much more selective in what they print. It is expected that a surge in printing activity may occur during the next fall semester when a new class of freshmen begin to use InfoTrac.

An additional hidden cost of workstations located in public areas is the cost of securing equipment. Anchor pads and lock down devices are often a necessary cost of business. The cost to lock down the equipment for a single workstation may run as high as $500.

CONCLUSION

InfoTrac has been phenomenally popular with patrons at UIUC. Its ability to provide bibliographic citations quickly with a minimum knowledge of system structure has overridden any shortcomings InfoTrac has,

including failure to perform Boolean searches. This enthusiastic response indicates that optical disc databases will take their place alongside vendor-based online systems and locally produced electronic databases as an essential component of reference service in the years ahead.

This brings us back to the beginning point of this article and the price of a pizza. CD-ROM products are providing an alternative for students to the rising prices of vendor-based online databases. While the shift in charges from the user to the library places electronic reference products in the same category as paper sources which are free to the user, it presents serious questions concerning library cost and database quality. As more CD-ROM products become available commercially, librarians will be faced with difficult and perplexing questions about pricing, hardware and software, standards, compatibility, and search capabilities. Very few product reviews and use studies of specific databases are available now. Careful planning and evaluation will be essential in considering purchase of these high-priced resources (Herther, 1986). Product quality, comparable resources, and use or need assessments are factors which should be considered. Criteria will be needed to provide a framework for evaluating the burgeoning number of CD-ROM products (Miller, 1987). Many questions remain. It is clear that while InfoTrac marks the beginning of microcomputer-based electronic reference technology, it is definitely not the end.

REFERENCES

Alberico, R. (1987). Justifying CD-ROM. *Small Computers in Libraries, 7*(February), 18-20.

Allen, R. J. (1985). The CD-ROM services of SilverPlatter Information, Inc. *Library Hi Tech, 3*(12), 49-60.

Beltran, A. B. (1987). InfoTrac at Indiana University: A second look. *Database, 10*(February), 48-50.

Beltran, A. B. (1986). Use of InfoTrac in a university library. *Database, 9*(June), 63-66.

Ernest, D. J., & Monath, J. (1986). User reaction to a computerized periodical index. *College & Research Libraries News, 47*(May), 315-318.

Hall, C.; Talan, H.; & Pease, B. (1987). InfoTrac in academic libraries: What's missing in the new technology? *Database, 10*(February), 52-56.

Herther, N. (1986). A planning model for optical product evaluation. *Online, 10*(September), 128-130.

Krismann, C. (1986). Byte line. *Colorado Libraries, 12*(March), 32.

Miller, D. C. (1987). Evaluating CD-ROMS: To buy or what to buy? *Database, 10*(June), 36-42.

Pease, B., & Post, W. (1985). InfoTrac: A review of an optical disc based public index. *Serials Review, 11*(Winter), 57-61.

Stephens, K. (1986). Laserdisc technology enters mainstream. *American Libraries, 17*(April), 252.

Tenopir, C. (1986). InfoTrac: A laser disc system. *Library Journal, 111*(September 1), 168-169.

Van Arsdale, W. O., & Ostrye, A. T. (1986). InfoTrac: A second opinion. *American Libraries, 17*(July/August), 514-515.

Walker, M. A., & Westneat, H. (1985). Using InfoTrac in an academic library. *Reference Services Review, 13*(Winter), 17-22.